Remarks

Reconsideration of this Application is respectfully requested.

I. Status of the Claims

Upon entry of the foregoing amendment, claims 31-122 are pending in the application, with 31-35, 52, 70, 89 and 106 being the independent claims. Claims 1-30 were previously cancelled without prejudice to or disclaimer of the subject matter therein. Claims 32-52, 54, 57, 59, 61, 63-65, 70, 72, 75, 77, 79, 81-83, 89, 91, 94, 96, 98, 100-102, 106, 108, 111, 113, 115, 117-119 and 122 are sought to be amended. These changes are believed to introduce no new matter, and their entry is respectfully requested.

Based on the above amendment and the following remarks, Applicants respectfully request that the Examiner reconsider all outstanding objections and rejections and that they be withdrawn.

II. The Amendments

Claims 32-52, 54, 57, 59, 61, 63-65, 70, 72, 75, 77, 79, 81-83, 89, 91, 94, 96, 98, 100-102, 106, 108, 111, 113, 115, 117-119 and 122 have been amended to more particularly point out what Applicants regard as the invention. Claims 32-34 have been amended to explicitly recite that the claimed polypeptides have *cellulase activity*. Claims 42 and 44, as amended, specify that the enzyme preparation is obtained by a process comprising culturing a host cell transformed with a nucleic acid sequence encoding a polypeptide having *cellulase activity*. Claims 49-51 specify that the enzyme preparation has *cellulase activity*. Support for the amendment to claims 32-34, 42, 44

and 49-51 can be found, *inter alia*, at page 11, lines 15-27, page 17, line 30, through page 19, line 2, and in claim 35 as originally filed.

Claims 35-51, as amended, specify that the enzyme preparation is an *enzyme extract preparation*. Support for the amendment to claims 35-51 can be found, *inter alia*, at page 11, lines 2-11, of the specification.

Claims 32, 34-35, 37, 40, 42, 44, 52, 54, 57, 59, 61, 70, 72, 75, 77, 79, 89, 91, 94, 96, 98, 106, 108, 111, 113 and 115 have been amended to recite that the polypeptide having cellulase activity has at least *90% identity to the amino acid sequence set forth in Figures 23A-C and SEQ ID NO: 35*, or has at least *90% identity to amino acids 23-452 of the amino acid sequence set forth in Figures 23A-C and SEQ ID NO: 35*. Support for the amendment to claims 32, 34-35, 37, 40, 42, 44, 52, 54, 57, 59, 61, 70, 72, 75, 77, 79, 89, 91, 94, 96, 98, 106, 108, 111, 113 and 115 can be found, *inter alia*, at page 11, lines 23-27, of the specification.

Claims 46-48, 63-65, 81-83, 100-102 and 117-119 have been amended to delete the species *Sporotrichum*, *Myceliophthora* and *Chaetomium* from the claims and correct formal matter. Support for the amendment to claims 46-48, 63-65, 81-83, 100-102 and 117-119 can be found, *inter alia*, at page 4, lines 18-22, of the specification.

Claims 70 and 122 have been amended to correct formal matter.

The amendments to the claims do not introduce any new matter and do not affect the scope of any of the pending claims. The claims have been amended to address the Examiner's concern with regard to patentable subject matter.

Based on the above amendments and the following remarks, Applicants respectfully request that the Examiner reconsider all outstanding objections and rejections and that they be withdrawn.

III. The Rejections Under 35 U.S.C. § 112, Second Paragraph

At page 2 of the Office Action, the Examiner has rejected claims 46, 48, 63, 65, 70, 81, 83, 100, 102, 117, 119 and 122 under 35 U.S. C. § 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which Applicant regards as the invention. In particular, the Examiner has stated that claims 46, 63, 81, 100 and 117 recite an incorrect Markush group because of the preposition "or" before the last member of the group. Further, the Examiner has maintained that claims 48, 65, 83, 102 and 119 are confusing and incorrect because the preposition "or" is recited three times in the claims, rather than once. Additionally, the Examiner has asserted that claim 70 is indefinite and confusing because it recites the preposition "or" twice, rather than once, and it recites the phrase "materials like". Finally, the Examiner has stated that claim 122 is confusing and incorrect, because the claim recites the phrase "the enzyme preparation is a surface active agent."

Solely to expedite prosecution, and not in acquiescence to the Examiner's rejection, Applicants have amended claims 46, 63, 81, 100 and 117 to provide the correct recitation of Markush groups in the claims. Further, Applicants have amended claims 48, 65, 83, 102 and 119 to delete the preposition "or" in the claims. Additionally, claim 70 has been amended to recite the phrase "such as fabrics, garments or yarns" and claim 122 has been amended to recite the phrase "wherein the enzyme preparation further comprises a surface active agent", as suggested by the Examiner. As such, Applicants

submit that the 35 U.S.C. 112, second paragraph, rejection of claims 46, 48, 63, 65, 70, 81, 83, 100, 102, 117, 119 and 122 has been rendered moot and should be withdrawn.

IV. The Rejections Under 35 U.S.C. § 101

A. The Rejection of Claims 35-44 and 46-51

At page 3 of the Office Action, the Examiner has rejected claims 35-44 and 46-51 under 35 U.S.C. § 101 on the ground that the claimed invention is directed to non-statutory subject matter. According to the Examiner, the "enzyme preparation" recited in the claims reads on the enzyme in nature and does not show the intervention of "the hand of man." Applicants respectfully traverse the rejection.

Contrary to the Examiner's assertion, an enzyme preparation is not an enzyme in nature. The specification clearly defines an enzyme preparation as "a composition containing enzymes" and states that "[p]referably the enzymes have been extracted from (either partially or completely purified from) a microbe or the medium used to grow such microbe." *See* page 11, lines 2-6. Accordingly, the Examiner's assertion that the claimed enzyme preparation reads on the enzyme in nature is wrong, and the rejection of claims 35-44 and 46-51 under 35 U.S.C. § 101 is improper and should be withdrawn. Nevertheless, solely to advance prosecution, and not in acquiescence to the Examiner's rejections, Applicants have amended claims 35-44 and 46-51 to recite an "enzyme extract preparation". Accordingly, the Examiner's rejection of claims 35-44 and 46-51 under 35 U.S.C. § 101 is now moot.

B. The Rejection of Claims 32-35, 37, 39-40 and 42-51

The Examiner has rejected claims 32-35, 37, 39-40 and 42-51 under 35 U.S.C. § 101 on the ground that the claimed invention is not supported by either a specific and substantial asserted utility or a well established utility.

Applicants respectfully traverse the rejection. Applicants note that the specification defines an equivalent amino acid sequence as follows:

> By an amino acid sequence that is an "***equivalent***" of a specific amino acid sequence is meant an amino acid sequence that is not identical to the specific amino acid sequence, but rather contains at least some amino acid changes (deletions, substitutions, inversions, insertions, etc) that do not essentially affect the biological activity of the protein as compared to a similar activity of the specific amino acid sequence, when used for a desired purpose. The biological activity of a cellulase, is its catalytic activity, and/or its ability to bind to cellulosic material. The biological activity of the 50K-cellulase B further includes its ability to act synergistically with the cellulases. Preferably, an "equivalent" amino acid sequence contains at least 80%-99% identity at the amino acid level to the specific amino acid sequence, most preferably at least 90% and in an especially highly preferable embodiment, at least 95% identity, at the amino acid level.

See specification at page 11, lines 15-22 (emphasis in original). Accordingly, the specification provides an asserted utility for the polypeptides claimed in the present application, as *they all have cellulase activity.*

Further, the specification asserts a number of specific and substantial utilities for the polypeptides and enzyme preparations of the invention. In particular, the specification teaches the use of the enzyme preparations in textile industry, including biostoning and biofinishing, in the detergent industry and in the pulp and paper industry. *See* pages 25-27, Examples 3-8 and Table VI.

Furthermore, it has long being known in the art that cellulases have numerous practical uses in the textile and detergent industries. *See* pages 1-4 of the specification. According to the Revised Interim Utility Guidelines, this alone is sufficient to establish that the claimed invention satisfies the utility requirement of 35 U.S.C. § 101. *See "Well established utility"* at pages 7-8 of the *Revised Interim Utility Guidelines Training Materials*. Thus, not only do the claimed enzyme preparations have a well-established utility, but Applicants' specification has asserted specific utilities which are consistent with the well-established utilities known in the art. Accordingly, the Examiner's rejection of claims 32-35, 37, 39-40 and 42-51 under 35 U.S.C. § 101 is improper and should be withdrawn.

Moreover, Applicants wish to point out that claim 35 and claims 36-51, which depend from claim 35, are directed to an enzyme extract preparation comprising a polypeptide having *cellulase activity*. Further, solely to advance prosecution, and not in acquiescence to the Examiner's rejections, Applicants have amended claims 32-34, 42, 44 and 49-51. Claims 32-34 now specify that *the polypeptides of the invention have cellulase activity*; claims 42 and 44 specify that the enzyme extract preparation is obtained by a process comprising culturing a host cell transformed with a nucleic acid sequence encoding *a polypeptide having cellulase activity*; and claims 49-51 specify that *the enzyme extract preparation has cellulase activity*. Thus, the claimed invention is supported by both a specific and a well established utility. Accordingly, Applicants respectfully request that the Examiner reconsider and withdraw the rejection.

V. The Rejections Under 35 U.S.C. § 112, First Paragraph

A. The Rejection of Claims 32-35, 37, 39-40 and 42-51

At pages 3-4 of the Office Action, the Examiner has rejected claims 32-35, 37, 39-40 and 42-51 under 35 U.S.C. § 112, first paragraph, stating that since the claimed invention is not supported by either an asserted utility or a well established utility, one skilled in the art clearly would not know how to use the claimed invention. Applicants respectfully traverse the rejection.

Applicants assert that for the reasons stated above, the specification clearly provides an asserted specific utility for the claimed invention, which is consistent with a well-established utility known in the art. Further, Applicants have amended the claims to expressly recite that the polypeptides and enzyme extract preparations of the invention have cellulase activity. Accordingly, the Examiner's rejection of claims 32-35, 37, 39-40 and 42-51 under 35 U.S.C. § 112, first paragraph, is improper and should be withdrawn. Reconsideration and withdrawal of the rejection is, therefore, respectfully requested.

B. The Rejection of Claims 35, 38, 45-52, 55, 62-70, 73, 80-89, 92, 99-106, 109 and 116-122

At page 4 of the Office Action, the Examiner has rejected claims 35, 38, 45-52, 55, 62-70, 73, 80-89, 92, 99-106, 109 and 116-122 under 35 U.S.C. § 112, first paragraph, as containing subject matter which was not described in the specification in such a way as to enable one skilled in the art to which it pertains, or with which it is most nearly connected, to make and/or use the invention. Specifically, the Examiner has asserted that it is not clear that all of the requirements of 37 CFR 1.801-1.809 as to

deposit conditions and availability upon issuance of a U.S. Patent have been met for the strains DSM 11026, DSM 11-13 and DSM 11011.

Applicants respectfully traverse the rejection. Applicants wish to bring the Examiner's attention to the paragraph bridging pages 9-10 of the specification, which states the following:

> Plasmid pALK1229 was deposited as DSM 11026 on June 21, 1996 and λ4237/3 was deposited as DSM 11011 on June 21, 1996, and λ4237/18 was deposited as DSM 11013 on June 21, 1996, at the Deutsche Sammlung von Mikroorganismen und Zellkulturen GmbH, Mascheroder Weg 1 B, D-38124 Braunschweig, Germany. pALK1229 contains DNA coding for the 50K-cellulase B, λ4237/3 and λ4237/18 contain the 50K-cellulase B gene from *Melanocarpus albomyces* CBS 685.95.

Id.

In addition, Applicants submit the following statement:

Statement Regarding the Irrevocable Removal of All Restrictions Imposed by the Depositor on the Availability of the Deposited Biological Material Upon Granting of a Patent

> All restrictions imposed by the Depositor on the availability to the public of the deposited biological material in the present application will be irrevocably removed upon the granting of a patent.

Accordingly, all the requirements of 37 CFR 1.801-1.809 as to deposit conditions and availability have been met for the strains DSM 11026, DSM 11013 and DSM 11011. Reconsideration and withdrawal of the rejection is, therefore, respectfully requested.

C. The Rejection of Claims 32, 34-35, 37, 40, 42 and 44-51

At pages 4-5 of the Office Action, the Examiner has rejected claims 32, 34-35, 37, 40, 42 and 44-51 under 35 U.S.C. §112, first paragraph, as failing to comply with the

enablement requirement. According to the Examiner, the claims contain subject matter which was not described in the specification in such a way to enable one skilled in the art to which it pertains, or with which it is most nearly connected, to make and/or use the invention. Specifically, the Examiner has asserted that the specification does not teach an enzyme that is 80% identical to SEQ ID NO: 35 or 80% identical to residues 23-452 of SEQ ID NO: 35. Further, the Examiner has stated the following:

> It is well known that the change of even one amino acid can alter the activity of a protein. The specification does not teach which specific residues can be changed which [sic] residues and still retain enzymatic activity, nor does it teach what regions are important for binding and/or activity towards substrate, and therefore the instant claims should be limited to what is taught in the specification. In order to allow for allelic variants the examiner will allow claims drawn to 95% identity.

Id.

Applicants respectfully traverse the rejection. Claims 32, 34-35, 37, 40, 42 and 44-51 all require that the polypeptide or the enzyme extract preparation comprising the polypeptide of the invention have *cellulase activity*. Thus, the claims are only directed to variants that in fact have *cellulase activity*. Moreover, as stated above, the specification provides a clear definition of equivalent amino acid sequences as a) containing at least some amino acid changes "that do not essentially affect the biological activity of the protein as compared to a similar activity of the specific amino acid sequence", and b) containing "at least 80%-99% identity at the amino acid level to the specific amino acid sequence". *See* page 11, lines 15-22. Furthermore, the specification defines nucleic acid molecules that are homologous to the nucleic acid molecules of the invention as variations of the nucleic acid molecules that retain the same biological function and may be naturally occurring or synthetically produced. *See* page 20, lines 11-21.

Additionally, the specification defines the biological activity of a cellulase as its catalytic activity and/or its ability to bind to cellulosic material. *See* page 11, lines 15-27. Accordingly, the specification clearly identifies the polypeptides, which fall within the scope of the claims.

The Examiner contends that the change of even one amino acid can alter the activity of one protein and states that the specification does not teach which specific residues can be changed without affecting enzymatic activity, and what regions are important for substrate binding and/or enzymatic activity.

First, Applicants point out that the issues raised by the Examiner are irrelevant to the question as to whether the claimed invention complies with the enablement requirement. Applicants have already shown that the claims are only directed to variants that have *cellulase activity*.

Second, the Examiner's assertion is contradicted by the language of the claims. Solely to expedite prosecution, and not in acquiescence to the Examiner's rejection, Applicants have amended claims 32, 34-35, 37, 40, 42, 44, 52, 54, 57, 59, 61, 70, 72, 75, 77, 79, 89, 91, 94, 96, 98, 106, 108, 11, 113 and 115. The claims now require that the polypeptide variants have at least *90% identity to the amino acid sequence set forth in Figures 23A-C and SEQ ID NO: 35*, or have at least *90% identity to amino acids 23-452 of the amino acid sequence set forth in Figures 23A-C and SEQ ID NO: 35*. In addition, as stated above, claims 32-34 require that *the polypeptides of the invention have cellulase activity* and claims 35-51 require that the enzyme extract preparations of the invention comprise *a polypeptide having cellulase activity*. Thus, the claims, as amended, encompass only those polypeptides having SEQ ID NO: 35 or amino acids 23-452 of

SEQ ID NO: 35, polypeptides comprising the amino acid sequence encoded by the DNA insert contained in DSM 11026, DSM 11013 or DSM 11011, or those polypeptides that alternatively have at least *90% identity* to SEQ ID NO: 35 or at least *90% identity* to amino acids 23-452 of SEQ ID NO: 35, and enzyme extract preparations thereof, that ***retain cellulase activity***.

Applicants note that in the particular case of the enzyme 50K-cellulase B, 90% identity, as claimed in the present application, defines strict identity. Cellobiohydrolases are typically characterized by having a highly conserved cellulose binding domain (CBD), which is responsible for the high level of identity among cellobiohydrolase enzymes. However, as stated in the specification, the enzyme 50K-cellulase B has the surprising feature that it does not harbor the cellulose binding domain and its linker, unlike the *Humicola grisea* cellobiohydrolase I and many other cellobiohydrolases. *See* specification at page 78, lines 8-11. Thus, a polypeptide having at least 90% identity to SEQ ID NO: 35 or at least 90% identity to amino acids 23-452 of SEQ ID NO: 35, despite the lack of a CBD, would be nearly identical to those polypeptides having SEQ ID NO: 35 or amino acids 23-452 of SEQ ID NO: 35, respectively.

Furthermore, methods for making polypeptides that retain the biological activity of a known protein are known in the art. *See* Bowie *et al., Science 247*: 1306-1310 (1990) (Attached as Exhibit A). Most fungal cellulases have a conserved domain structure consisting of a large catalytic domain. Many cellulases have also a smaller cellulose binding domain. The two domains are separated by a distinct linker region. *See* Heikinheimo, *VTT Publication 483* (2002) (Attached as Exhibit B). Thus, given the teachings of the specification and the information about cellulase conserved domains

available in the prior art, the artisan skilled in the art could easily make polypeptides having cellulase activity as claimed in the present application. For example, as stated above, the enzyme 50K-cellulase B surprisingly lacks a cellulose binding domain and its linker. The artisan skilled in the art could easily modify the 50K-cellulase B by introducing the cellulose binding domain of a different endoglucanase, without affecting its cellobiohydrolase activity. Accordingly, the 90% identity language of the claims is justified.

Accordingly, in view of the above, the Examiner's rejection of claims 32, 34-35, 37, 40, 42 and 44-51 under 35 U.S.C. §112, first paragraph, is improper. Reconsideration and withdrawal of the rejection is respectfully requested.

D. The Rejection of Claims 55-122

At page 5 of the Office Action, the Examiner has rejected claims 52-122 under 35 U.S.C. §112, first paragraph, as failing to comply with the written description requirement. According to the Examiner, the claims contain subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventors, at the time the application was filed, had possession of the claimed invention. Specifically, with regard to the 50K-cellulase B, the Examiner has stated the following:

> Other than the indigo dye release in Table VI, there is apparently nothing disclosed in the instant specification regarding the use this enzyme [sic] for anything and specifically not for biostoning, biofinishing, treating wood-derived pulp or fiber or improving the quality of animal feed. The significance of the indigo dye release is not understood regarding the instant claims. Therefore, the instant specification does not teach that at the time the

> application was filed applicants had possession of the instant claims.

Id.

Applicants respectfully traverse the rejection. Applicants assert that the specification expressly teaches the use of the enzyme preparations of the invention in the textile industry (*See* page 25, lines 22-24), including biostoning (*See* page 26, lines 3-22 and Example 3) and biofinishing (*See* page 26, lines 23-29), in the detergent industry (*See* paragraph bridging pages 26-27), and in the paper and pulp industry (*See* page 27, lines 11-25).

Furthermore, Applicants state that the specification clearly shows the beneficial effect of the 50K-cellulase B in biostoning and biofinishing, and in preventing backstaining. Specifically, Example 3 and Example 9 describe how the enzyme preparations of the invention were tested for their ability to release dye in neutral conditions from the indigo dyed cotton-containing denim fabric to provide the fabric with a stone-washed look. As described at page 3 of the specification, a stone-washed denim is an indigo-dyed denim with a faded appearance. The process, called biostoning, may be carried out with pumice stones or, more efficiently, with cellulase enzymes. These enzymes have the property of attacking the surface of the fabric, where the dye is located, leaving the interior of the fabric intact. During biostoning with cellulases, however, the released indigo dye tends to redeposit on the surface of the denim fabric, reducing the biostoning effect and causing the undesired effect of backstaining. The use of acid cellulases is hampered by their tendency to promote backstaining and a weakening of fabrics.

Table VI in the specification shows the results obtained from the indigo dye release test for the different enzyme preparations of the invention. The L parameter in Table VI indicates the lightening of the right side (L_{right}) or reverse side ($L_{reverse}$) of the blue denim, whereas the $b_{reverse}$ parameter indicates the blueing of the reverse side of the denim. The results in Table VI clearly indicate that the 50K-cellulase B does not increase the release of the indigo dye from the outer surface of the denim, but effectively decreases the backstaining of dye onto the reverse side of the denim, as the $L_{reverse}$ increases and the $b_{reverse}$ decreases as compared to the control. *See* also the paragraph bridging pages 46-47 in the specification.

Accordingly, the specification provides a full description of the use and benefits of the enzyme preparations of the invention. Thus, there is no basis on which to reject the claimed methods under 35 U.S.C. §112, first paragraph, for failing to comply with the written description requirement, and the Examiner's rejection is improper.

The Examiner relies on the fact that the 50K-cellulase B lacks endoglucanase activity and a cellulose binding domain to support his rejection. Applicants point out that this is irrelevant to the question of whether the specification describes the use of the claimed enzyme preparation. It is known in the art that fungi and some bacteria produce three different kinds of cellulases: endoglucanases, which hydrolyze the internal bonds of cellulose in the amorphous regions, producing new chain ends and causing a considerable decrease in the degree of polymerization (DP) of cellulose; cellobiohydrolases, also called exoglucanases, which attack the ends of the cellulose chains producing cellobiose and decrease the DP very slowly; and β-glucosidases, which catalyze the hydrolysis of cellobiose to glucose. *See* Exhibit B, pages 14-15.

Cellobiohydrolases act synergistically with each other and can act on cellulose without the aid of endoglucanases. *See* Exhibit B at page 15. The 50K-cellulase B is a cellobiohydrolase enzyme, which initiates hydrolysis of cellulose at the chain ends. Accordingly, the 50K-cellulase B has cellulase activity.

With regard to the lack of a cellulose binding domain in the 50K-cellulase B, while it is known that the overall binding efficiency, and, consequently, the hydrolitic activity, of cellulase enzymes is enhanced by the presence of the CBD, not all cellulases have a CBD. *See* Miettinen-Oinonen, *VTT Publication 550* (2004) (attached as Exhibit C). Exhibit C reports how cellulases lacking the CBD decrease indigo staining and cause less backstaining than cellulases having a CBD. The prevention of backstaining has been attributed to two factors: a) the reduced affinity of the cellulase lacking a CBD for indigo; and b) the reduced binding of the cellulase to cellulose. *See* Exhibit C at page 70. Thus, contrary to the Examiner's concern, it is clear that the presence of a CBD is not required for the 50K-cellulase B to act as a cellobiohydrolase and hydrolize cellulose without the aid of endoglucanases. These particular properties render the 50K-cellulase B particularly suitable for applications in the textile industry, as fully demonstrated in the specification.

Accordingly, Applicants respectfully submit that for all the reasons stated above, the Examiner's rejection of claims 52-122 under 35 U.S.C. §112, first paragraph, is improper and request its withdrawal.

VI. The Rejection Under 35 U.S.C. § 102(b)

At page 6 of the Office Action, the Examiner has rejected claims 31-40 and 45-48 under 35 U.S.C. §102(b), as being anticipated by U.S. Patent No. 4,081,328 to Skinner *et*

al. (the '328 patent). According to the Examiner, the cellulase from *Thielavia* disclosed in the '328 patent is inherently the enzyme claimed in the present application, absent a convincing proof to the contrary.

Applicants respectfully traverse the rejection.

First, Applicants assert the Examiner has not provided sufficient evidence to support the statement that the cellulase disclosed in the '328 patent is inherently the same enzyme claimed in the present application. The Examiner's rejection appears to be based entirely on the mere fact that the '328 patent discloses a cellulase isolated from *Thielavia terrestris*. But this conclusion ignores the fact that multiple cellulases have been isolated from *Melanocarpus albomyces* and *Thielavia terrestris*. Furthermore, the fungus *Thielavia terrestris* is not closely related to the fungi *Melanocarpus albomyces* or *Thielavia albomyces*. *See* Guarro *et al. Mycol. Res. 100(1)*: 75-78 (1996) (Attached as Exhibit D).

Second, the cellulase preparations obtained from *Thielavia terrestris* in the '328 patent are different from those obtained from *Melanocarpus albomyces* or *Thielavia albomyces*. In fact, the '328 patent discloses a cellulase enzyme preparation produced by the fungus *Thielavia terrestris*, which possess both C_1 and C_x types of enzyme activity and optimal activity under moderately acid conditions of pH 5.0 to 5.6.. *See* column 3, lines 60-63 and claim 1. The cellulase preparations of the present application, which are obtained from *Melanocarpus albomyces* or *Thielavia albomyces*, have, instead, a more alkaline optimum pH of 5.5, to 6.5, and are active even at pH 9.0. *See* Figure 4A in the specification.

Furthermore, the '328 patent defines the C_1-enzyme type activity of the cellulase preparation as the enzyme's ability to depolymerize natural cellulose, and the C_x -enzyme activity as the enzyme's ability to decompose carboxymethylcellulose (CMC). *See* col. 1. The '328 patent teaches that the crude enzyme preparations of the invention can hydrolyze cotton to the extent of 20% within 24 hours at 60°-65° C at pH 5.0. *See* col. 4.

Example 12 in the specification of the present application describes the properties of the 50K-cellulase B as follows:

> ***No detectable endoglucanase*** activity could be measured for the 50K-cellulase B with hydroxyethylcellulose or ***carboxymethylcellulose***. At acidic pH, the 50K-cellulase B had a low cellobiohydrolase activity, which at pH 5 was less than 0.1% of that of the 50K cellulase. In addition, the 50K-cellulase B had a detectable activity towards filter paper at pH 4.8 and acid swollen, amorphic Solca Floc-cellulose at pH 5 and 7 used in enzyme activity determinations.

Id. (Emphasis added).

It is evident, upon comparison of the two enzyme preparations, that the claimed 50K-cellulase B ***is not*** the same enzyme preparation disclosed in the '328 patent. First, the 50K-cellulase B of the present invention has no detectable endoglucanase activity when measured with hydroxyethylcellulose or carboxymethylcellulose, and thus, unlike the cellulase of the '328 patent, has no C_1 -enzyme activity and does not cause a considerable decrease in the degree of polymerization of the cellulose. Second, the claimed 50K-cellulase B does not decompose CMC and thus, unlike the cellulase of the '328 patent, does not have C_x -enzyme activity.

Third, the '328 patent discloses a cellulase contained in the supernatant obtained from centrifugation of the liquid culture of *Thielavia terrestris*. The '328 patent fails to

teach or suggest a fractionated, purified or enriched cellobiohydrolase preparation, as claimed in the present application.

For all the reasons stated above, Applicants respectfully assert that the '328 patent cannot inherently anticipate claims 31-40 and 45-48 of the present application. Accordingly, the rejection is improper and should be withdrawn.

VII. The Rejection Under 35 U.S.C. § 103(a)

At pages 6-7 of the Office Action, the Examiner has rejected claims 31-40, 45-57, 62-75, 80-94, 99-111 and 116-122 under 35 U.S.C. §103(a), as being unpatentable over U.S. Patent No. 4,081,328 to Skinner *et al.* (the '328 patent), in view of U.S. Patent No. 4,832,864 to Olson (the '864 patent), U.S. Patent No. 4,912,056 to Olson (the '056 patent), U.S. Patent No. 5,120,463 to Bjork *et al.* (the '463 patent), U.S. Patent Nos. 5,122,159 and 5,213,581 to Olson *et al.* (the '159 and the '581 patents), U.S. Patent No. 5,232,851 to Cox *et al.* (the '851 patent), U.S. Patent Nos. 5,246,853, 5,290,474, 5,525,507 and 5,650,322 to Clarkson *et al.* (the '853, '474, '507 and '322 patents), U.S. Patent No. 5,298,405 to Nevalainen *et al.* (the '405 patent) and other well known prior art. According to the Examiner, the '328 patent is characterized as described above and the secondary references as well as other well known prior art teach the use of cellulases for biostoning, biofinishing, treating wood-derived pulp and improving the quality of animal feed. Further, the Examiner has stated that the instant claims would have been obvious to one of ordinary skill in the art over the '328 patent in view of the secondary references, as well as known prior art, absent unexpected results.

Applicants respectfully traverse the rejection. Applicants have clearly demonstrated above that the claimed 50K-cellulase B is not the same enzyme preparation disclosed in the '328 patent. The secondary references are all cited merely for their teaching of the use of cellulases in the textile industry, and thus do not cure the deficiencies of the '328 patent.

Specifically, the '864 patent to Olson describes a solid concentrate composition consisting essentially of cellulase enzyme composition, an electrolyte and a builder or buffer. The composition can be used in "stone-washing" denim. The cellulase enzymes are not described and only a general listing of cellulase producing organisms is given.

The '056 patent to Olson describes a method for providing a stone-washed appearance using cellulase composition. The cellulase enzymes are not described and only a general listing of cellulase producing organisms is given.

The '463 patent to Bjork *et al.* describes detergent compositions enriched in Cellobiohydrolase I. Cellulases are preferably derived from *Trichoderma reesei*, *Trichoderma koningii*, or *Penicillium sp.*

The '159 patent to Olson *et al.* describes processes and compositions for obtaining "stone-washed" look in clothing. The cellulase enzymes are not described and only a general listing of cellulase producing organisms is given.

The '581 patent to Olson *et al.* describes methods and compositions for obtaining "stone-washed" look in clothing. The cellulase enzymes are not described and only a general listing of cellulase producing organisms is given.

The '851 patent to Cox *et al.* describes methods for treating non-dyed and non-finished cotton woven fabric with cellulase to improve appearance and feel

characteristics. Preferred cellulases are obtained from *Trichoderma reesei*, *Trichoderma koningii*, *Penicilluim sp.*, or *Humicola insolens*. The cellulase enzymes to be used in the method are not described.

The '853 patent to Clarkson *et al.* describes a method for finishing cotton-containing fabrics using cellulase compositions that are free of cellobihydrolase I, and preferably also free of cellobiohydrolase II.

The '474 patent to Clarkson *et al.* describes detergent compositions containing 0,01 to about 5 w% of a substantially pure endoglucanase III from *Trichoderma ssp.* Preferably the amount of cellobiohydrolase I components based on the total weight of cellulase proteins does not exceed 5%. Cellobiohydrolases are obtained from *Trichoderma ssp.*

The '507 patent to Clarkson *et al.* describes methods for treating cotton-containing fabric with cellulase composition containing endoglucanase and free of all cellobiohydrolases I, preferably also free of cellobiohydrolases II.

The '322 patent to Clarkson *et al.* describes a method for reducing colorant redeposition during stonewashing of colored fabrics with a cellulase composition substantially free of cellobiohydrolase and comprising endoglucanase III derived from *Trichoderma sp.*

The '405 patent to Nevalainen *et al.* describes a *Trichoderma* host expressing large amounts of desirable enzymes and deficient in at least one enzymatic component of the cellulase degradation system, and methods of use. Exemplified gene deletions are *Trichoderma reesei* major cellulases, namely, cellobiohydrolase I and cellobiohydrolase II.

None of the cited references suggests the use of cellobiohydrolases isolated from *Melanocarpus*, and none of the cited references teaches or suggests that cellobiohydrolase isolated from *Melanocarpus* reduces backstaining. To the contrary, some of the cited references even suggests removal of cellobiohydrolases. *See* the '853 patent, the '507 patent and the '322 patent to Clarkson *et al.* and the '405 patent to Nevalainen *et al.*

Accordingly, the rejection of claims 31-40, 45-57, 62-75, 80-94, 99-111 and 116-122 under 35 U.S.C. §103(a) is improper and should be withdrawn.

Conclusion

All of the stated grounds of objection and rejection have been properly traversed, accommodated, or rendered moot. Applicants therefore respectfully request that the Examiner reconsider all presently outstanding objections and rejections and that they be withdrawn. Applicants believe that a full and complete reply has been made to the outstanding Office Action and, as such, the present application is in condition for allowance. If the Examiner believes, for any reason, that personal communication will expedite prosecution of this application, the Examiner is invited to telephone the undersigned at the number provided.

Prompt and favorable consideration of this Amendment and Reply is respectfully requested.

Respectfully submitted,

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